

Application No.: 10/662,426

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Attorney Docket No.: 146712004200

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Patent Application of: Wei-Ming LEE et al.

Application No.: 10/662,426

Confirmation No.: 2374

Filed: September 16, 2003

Art Unit: 1746

For: OBLIQUE BURNISH/WIPE MECHANISM
FOR HARD DRIVE DISK LIKE MEDIA

Examiner: S. T. Chaudhry

APPELLANT'S OPENING BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is a timely appeal from the final rejection of claims 1, 2 and 4-10 in the Action of April 21, 2006.

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is Seagate Technology LLC, 920 Disc Drive, Scotts Valley, California 95066.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences within the meaning of 37 CFR 41.37(c)(1)(ii) known to appellant or his undersigned counsel.

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III. STATUS OF CLAIMS

Claims 1, 2 and 4-10 are pending in this application. Claims 3, 13 and 20 were canceled during the course of prosecution. Claims 11, 12 and 14-19 stand withdrawn from consideration.

Claim 9 has been rejected under 35 USC 112, first paragraph.

Claims 1-10 and 20 were rejected under 35 USC 112, second paragraph.

Claims 1-8 and 20 were rejected as being anticipated by Tateyama.

Claims 9 and 10 were rejected under 35 USC 103(a) as unpatentable over Tateyama.

Appellants appeal the final rejection of claims 1, 2 and 4-10. The appealed claims are reproduced in the attached Appendix.

IV. STATUS OF AMENDMENTS

There are no pending amendments to the appealed claims.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Embodiments of the present invention relate to a cleaning apparatus comprising an article, a burnishing object positioned over or under the article, and a device that (a) rotates the burnishing object at an offset angle that is variable over an area of the article and (b) translates the burnishing object relative to the article to advance a position of a contact of the burnishing object with the article across a surface of the article. Preferably, the burnishing object is not contacted to the article by air directed to the burnishing object and the article is a rotating disk. Also, preferably the offset angle changes as the position of the contact advances from an inner diameter to an outer diameter of the disk. Preferably, the cleaning apparatus removes particles from the surface of the article. Preferably, the device simultaneously rotates and translates the burnishing object and the

device creates a wiper blade motion of the burnishing object on the surface of the article.

Preferably, the device allows the burnishing object to make and break the contact of the burnishing object with the article across the surface of the article. In one embodiment, the burnishing object is a tape or a pad.

Another embodiment is a method of operating a cleaning apparatus comprising an article and a burnishing object positioned over or under the article, the method comprising (a) rotating the burnishing object at an offset angle that is variable over an area of the article and (b) translating the burnishing object relative to the article to advance a position of a contact of the burnishing object with the article across a surface of the article.

Another embodiment is a cleaning apparatus comprising an article, a burnishing object positioned over or under the article, and means for simultaneously translating and rotating the burnishing object on the article.

A technique for buffing/burnishing is tape burnishing (buffing). However, the technique is attendant with numerous disadvantages. For example, it is extremely difficult to provide a clean and smooth surface due to debris formed by mechanical abrasions.

Tape burnish and tape wipe processes in which the tape moves orthogonal to the burnishing object without any rotational degree of freedom of the burnishing tape cannot generally effectively remove the particles on the surface of the disk. These particles cause failure and/or decreased performance of the magnetic disc drives. This problem can be especially critical in magnetic discs made by the servo pattern printing process. This is because the particles on the surface can damage the stamper, which sequentially affects the quality of the printed discs. This invention allows the tape burnishing and tape wiping processes to be improved to meet the demands of high storage density and low fly height criteria.

The cleaning apparatus for burnishing asperities or defects from the surfaces of an article, e.g., a rigid magnetic disk, could use an abrasive burnishing tape, a pad, a cloth, a scrubber or any burnishing object that contacts and cleans the surface of the object. If the object is a disk,

then the disk preferably rotates on a spindle while the burnishing object contacts the surface of the disk. The burnishing object could be held stationary at one location on the surface of the disk or moved during the burnishing process.

In one embodiment, the burnishing object is contacted to the article by air directed to the burnishing object. On the other hand, in another embodiment, the burnishing object is not contacted to the article by air directed to the burnishing object.

The trajectory of the burnishing object relative to the burnished disc can be controlled to optimize the particle removal effectiveness. A preferred embodiment is an oblique tape burnish mechanism that would allow extra rotation degree of freedom besides the translational degree of freedom to effectively remove the particles from the surface of a rotating disk. The oblique angle of the mechanism can be adjusted so that the kinematical condition can be optimized relative to the motion of the area of the disk being burnished. The oblique angle provide a condition to load and unload the burnishing object on the disc which could maximize the burnish area at the inner and outer diameters of the discs which are other difficult to burnish with a burnishing device with just translational degree of freedom. The combined translation and rotation motion of the burnish pad simulates particle "wiping down" motion.

Figure 2 of the specification shows one embodiment of the burnishing apparatus on the surface of a disk with outer and inner diameters of 22 and 30, respectively. The burnishing apparatus includes a burnishing object 19, shown as a shaded object, which could be a burnishing tape, extending along the arm 20 of the burnishing apparatus. The angle between the arm 20 and a line passing through the center of disk is called the offset angle and is designated as " α " for the particular angle shown in Figure 2.

In one embodiment, the process sequence for burnishing are the following: (1) Position the center of the burnishing object at location 1 on the disk and set the offset angle at α . (2) Translate the center of burnishing object linearly to location 2 on the disk while maintaining the

offset angle at α . (3) Rotate the arm and change the offset angle to β while maintaining the center of the burnishing object at location 2.

In one embodiment, the process sequence for burnishing are the following: (1) Position the center of the burnishing object at location 1 on the disk and set the offset angle at α . (2) Translate the center of burnishing object linearly to location 2 on the disk while rotating the arm and changing the offset angle to β .

In yet another embodiment, the process sequence for burnishing are the following: (1) Position the center of the burnishing object at location 1 on the disk and set the offset angle at α . (2) Translate the center of burnishing object linearly to location 2 on the disk while rotating the arm and changing the offset angle to β . (3) Translate the center of burnishing object linearly to location 3 near the outer diameter 22 of the disk while rotating the arm and changing the offset angle to γ .

Other embodiments could be any combinations of the above embodiments. In addition, other kinematical conditions that allow both translational and rotational movements of the burnishing object are possible.

Figure 3 of the specification shows another embodiment of a device burnishing apparatus that allows both translational and rotational movements of the burnishing object. This device has two arms. The first arm has translational movement. The second arm is pivotally attached to the first arm and has rotational movement. The burnishing object is attached to the second arm. The combined movements of the first and second arms allow the burnishing object to have both translational and rotational movements, sequentially or simultaneously, over the surface of a burnished article.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellants request review of the following grounds of rejection:

(1) Claim 9 for being rejected under 35 USC 112, first paragraph.

(2) Claims 1-10 and 20 for being rejected under 35 USC 112, second paragraph.

(3) Claims 1-8 and 20 for being rejected as being anticipated by Tateyama.

(4) Claims 9 and 10 for being rejected under 35 USC 103(a) as unpatentable over Tateyama.

VII. ARGUMENTS

A. THE REJECTION OF CLAIM 9 UNDER 35 USC 112, FIRST PARAGRAPH IS INCORRECT.

The Examiner's position stated in the final Action of April 21, 2006, is that it is not clear how the tape is rotated on the article (disc) while translating on the article since the axis of rotation of the tape is not described. Appellants responded by explaining in the response of July 21, 2006, that the Examiner has not carefully reviewed the specification, in particular Figure 2 and the description of Figure 2 in paragraphs 29-32. Figure 2 clearly shows that the tape 19 is rotated over pulleys along the arm 20. One of the two pulleys at one end of arm 20 is shown in Figure 2 while the second pulley is not shown as it is covered by the arm. The arm 20 moves over the disc with a circular sweeping action with an offset angle " α " at any particular point in time. The arm could also move back and forth along the direction of the arm. In short, while the arm 20 moves with a circular sweeping action and/or backward and forward along the direction of the arm, the tape rotates over the two pulleys attached to the arm. Note that one of the pulleys could be attached to a motor such the pulley rotates, which in turn rotates the tape. As a result of these combined movements of the arm and tape, the tape is rotated on the article while translating on the article.

On page 2, lines 7-11, of the Advisory Action of August 3, 2006, the Examiner states:

This [i.e., the above] argument is not persuasive because the applicant has not shown wherein the specification the description of the figure describes "the tape 19 is rotated over pulleys along arm 20. One of the pulleys at one end of arm 20 is shown in Figure 2 while the second pulley is not shown as it is covered by the arm". Describing the Figure in the arguments does not full fill [*sic*, fulfill] the requirement of the 35 U.S.C[.], first paragraph.

Appellants respectively submit that the Examiner's position that "[d]escribing the Figure in the arguments does not full fill [*sic*, fulfill] the requirement of the 35 U.S.C[.], first paragraph" is contrary to the law.

As explained in MPEP 2163(I), the written description requirement has several policy objectives. “[T]he ‘essential goal’ of the description of the invention requirement is to clearly convey the information that an applicant has invented the subject matter which is claimed.” *In re Barker*, 559 F.2d 588, 592 n.4, 194 USPQ 470, 473 n.4 (CCPA 1977). Another objective is to put the public in possession of what the applicant claims as the invention. See *Regents of the University of California v. Eli Lilly*, 119 F.3d 1559, 1566, 43 USPQ2d 1398, 1404 (Fed. Cir. 1997), *cert. denied*, 523 U.S. 1089 (1998). “To satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that *one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention.*” MPEP 2163(I); emphasis added. MPEP 2163(I) further clarifies that “[a]n applicant shows possession of the claimed invention by describing the claimed invention with all of its limitations using such descriptive means as words, structures, *figures, diagrams*, and formulas that fully set forth the claimed invention.” Emphasis added. In short, the Examiner’s position that that “[d]escribing the Figure in the arguments does not full fill [*sic*, fulfill] the requirement of the 35 U.S.C, first paragraph” is clearly contrary to the law as possession of the invention can be shown by figures and diagrams in the specification.

B. THE REJECTION OF CLAIMS 1-10 AND 20 UNDER 35 USC 112, SECOND PARAGRAPH IS INCORRECT.

The Examiner stated in the final Action of April 21, 2006, that the meaning of the phrase “device that rotates the burnishing object” is indefinite. Appellants responded in the response of July 21, 2006, that in the context of Figure 2, Appellants have clearly explained how the device rotates the burnishing object. An example of the device that rotates a tape as the burnishing object is a pulley at one end of arm 20.

On page 2, lines 14 and 15, of the Advisory Action of August 3, 2006, the Examiner states that “[t]he specification does not provide any explanation of ‘a device that rotates the burnishing object.’” Clearly, this statement is *incorrect* as persons of ordinary skill in the art would recognize that the pulley at one end of arm 20 is a device that rotates the burnishing object such as a

tape. In short, there is nothing indefinite about the phrase “device that rotates the burnishing object” when construed in the context of the written description of the specification.

C. THE REJECTION OF CLAIMS 1-8 AND 20 AS BEING ANTICIPATED BY TATEYAMA IS INCORRECT.

Claim 20 has been canceled. Claim 1 recites “a device that (a) rotates the burnishing object to change the offset angle of the burnishing object and (b) *translates the burnishing object relative to the disk to advance a position of a contact of the burnishing object across the surface of the disk*” (emphasis added). In short, the device arm 20 in Figure 2 of the specification can rotate with different offset angles α and can *also* translate the burnishing object relative to the disk to advance a position of a contact of the burnishing object across the surface of the disk.¹ On the other hand, the burnishing object of Tateyama, i.e., brush 42, can only rotate along the shaft 44 extending in the Y direction and swing in the direction θ , but it *cannot* translate along the Y direction. See column 4, lines 9-11, of Tateyama. In fact, Tateyama *intentionally does not* translate brush 42 along the Y direction. If it did, then brush 42 would come in the path of wafer detecting sensors 71 and 72 which are positioned to extend their optical axis along the passage 61a in the rotating shaft 61. See column 5, lines 23-26, of Tateyama. In short, Tateyama does not teach nor suggest a device that *both* (a) rotates the burnishing object to change the offset angle of the burnishing object and (b) *translates the burnishing object relative to the disk to advance a position of a contact of the burnishing object across the surface of the disk*.

As stated above, claim 1 has a limitation that the “device ... translates the burnishing object relative to the disk to advance a position of a contact of the burnishing object across the surface of the disk.” In order to read this limitation on Tateyama, the burnishing object of Tateyama, i.e. brush 42, *must* translate along one of the axes, for example, the Y direction, relative to the disk of Tateyama to advance a position of a contact of brush 42 across the surface of the disk of Tateyama. On page 2, lines 16-19, of the Advisory Action of August 3, 2006, the Examiner

¹ Note that paragraph 30 of the specification explains: “In one embodiment, the process sequence for burnishing are the following: (1) Position the center of the burnishing object at location 1 on the disk and set the offset angle at α . (2) Translate the center of burnishing object linearly to location 2 on the disk while maintaining the offset angle at α . (3) Rotate the arm and change the offset angle to β while maintaining the center of the burnishing object at location 2.”

states that even though Appellants argued that the burnishing object of Tateyama cannot translate along the Y direction, “[t]his argument is not persuasive because this limitation that ‘the burnishing object translate[s] along the Y direction’ is not included in the claim.” Appellants respectfully submit that the Examiner is totally incorrect that claim 1 should recite that “the burnishing object translates along the Y direction.” This is because Tateyama *must* disclose something within the scope of the limitation “a device that ... translates the burnishing object relative to the disk to advance a position of a contact of the burnishing object across the surface of the disk” in order to anticipate claim 1; instead, Appellants are *not* required to limit their invention to that “the burnishing object translates along the Y direction” to mirror exactly what is missing in Tateyama as put forth by the Examiner.

Tateyama fails to disclose “a device that ... translates the burnishing object relative to the disk to advance a position of a contact of the burnishing object across the surface of the disk” as Appellants have clarified this point by explaining that the burnishing object of Tateyama, i.e. brush 42, does *not* translate in the Y direction (or in X and Z directions as is obvious from the plain reading of Tateyama) relative to the disk to advance a position of a contact of the burnishing object across the surface of the disk. Thus, the anticipation rejection of claims of claims 1-8 and 20 over Tateyama should be reversed.

D. THE REJECTION OF CLAIMS 9 AND 10 AS BEING OBVIOUS OVER TATEYAMA IS INCORRECT.

Tateyama only discloses the use of a brush as a burnishing tool. It does not disclose a pad or a tape. The Examiner’s position in the final Action of April 21, 2006, was that it would have been obvious to substitute a pad or a tape instead of a brush in the apparatus of Tateyama. The Examiner believed that the use of a brush in Tateyama is simply a design choice, though a tape or a pad could be interchangeably used in lieu of the brush. Appellants respectfully submitted in the response of July 21, 2006, that the Examiner was incorrect. The substrate cleaning device of Tateyama requires the burnishing object must rotate along the shaft 44 extending in the Y direction and swing in the direction θ . Both these requirements can only be met by using a circular brush such as that of Tateyama; neither a pad nor a tape could rotate along the shaft 44 of Tateyama.

In light of the above arguments of Appellants, the Examiner now states on page 3, lines 5-7, of the Advisory Action of August 3, 2006, that Appellants "argument [in the response of July 21, 2006] is not persuasive because the claims do not specify the dimensions and shape of the tap [sic, tape] or the pad. One of ordinary skill in the art could rap [sic, wrap] around the shaft with a tap [sic, tape] or a pad instead of a brush." Appellants respectfully submit that this new argument of the Examiner is totally illogical. After all, the burnishing object of Tateyama is a brush. Why would somebody wrap this brush with a tape or a pad?

In any case, claims 9 and 10 depend from claim 1. As explained above, Tateyama fails to disclose "a device that ... translates the burnishing object relative to the disk to advance a position of a contact of the burnishing object across the surface of the disk." Thus, Tateyama fails to disclose the invention of claims 9 and 10 *as a whole*.

VIII. CONCLUSION

For the reasons set forth above, the final, and thus appealable, rejection of claims 1, 2 and 4-10 in this application should be reversed. .

In the event the U.S. Patent and Trademark Office determines that an extension and/or other relief is required, Appellants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing Attorney Docket No. 146712004200.

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Respectfully submitted,

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APPENDIX OF APPEALED CLAIMS

1. A cleaning apparatus comprising a burnishing object positioned over or under a disk and extending adjacent a surface of the disk at an angle that is offset from a line passing through the center of the disk, and a device that (a) rotates the burnishing object to change the offset angle of the burnishing object and (b) translates the burnishing object relative to the disk to advance a position of a contact of the burnishing object across the surface of the disk,

wherein the device changes the offset angle of the burnishing object and translates the burnishing object while cleaning the disk.

2. The cleaning apparatus of claim 1; wherein the burnishing object is not contacted to the disk by air directed to the burnishing object.

4. The cleaning apparatus of claim 3; wherein the offset angle changes as the position of the contact advances from an inner diameter to an outer diameter of the disk.

5. The cleaning apparatus of claim 1, wherein the cleaning apparatus removes particles from the surface of the disk.

6. The cleaning apparatus of claim 1, wherein the device simultaneously rotates and translates the burnishing object.

7. The cleaning apparatus of claim 1, wherein the device creates a wiper blade motion of the burnishing object on the surface of the disk.

8. The cleaning apparatus of claim 1, wherein the device allows the burnishing object to make and break the contact of the burnishing object with the disk across the surface of the disk.

9. The cleaning apparatus of claim 1, wherein the burnishing object is a tape.

10. The cleaning apparatus of claim 1, wherein the burnishing object is a pad.